What is claimed is:

1. A wavelength tunable DBR laser diode comprising:

an optical waveguide section including an active section; and

a distributed Bragg reflector connected optically to the optical waveguide section;

wherein an optical waveguide section of the distributed Bragg reflector has a quantum well layer which has the number of one or more layers of periods and a structure independent of the optical waveguide section including the active section and which is disposed at least at a section extending in a direction of an optical axis of the distributed Bragg reflector, and the quantum well layer of the Bragg reflector has a function of amplifying an oscillation wave length of the wavelength tunable DBR laser diode.

2. A wavelength tunable DBR laser diode according to claim 1, wherein the optical waveguide section including the active section is optically connected to the distributed Bragg reflector by Butt-joint.

3. A wavelength tunable DBR laser diode according to claim 1, wherein a semiconductor optical amplifier is further optically connected to one end of an optical waveguide structure having the distributed Bragg reflector and the optical waveguide including the active section.

4. A wavelength tunable DBR laser diode according to claim 1, wherein a semiconductor optical modulator is further optically connected to one end of an optical waveguide structure having the distributed Bragg reflector, and the optical waveguide including the active section.

5. A wavelength tunable DBR laser diode according to claim 1, wherein a phase control section is optically connected between the distributed Bragg reflector and the optical waveguide section including the active section, and the quantum well layer which has the number of one or more layers of periods and a structure independent of the optical waveguide section including the active section and which is disposed at least at a portion or an entire portion of the distributed Bragg reflector and the phase control section.

6. A wavelength tunable DBR laser diode according to claim 1, wherein the distributed Bragg reflector has a diffraction grating, which includes diffraction grating areas differing in period located in at least a portion of the diffraction grating.

7. A wavelength tunable DBR laser diode,

wherein optical waveguide sections each having a distributed Bragg reflector and an optical waveguide section including an active section optically connected to each other are disposed in parallel, and one end of the distributed Bragg reflector is optically connected to one end of an optical

combiner; and

wherein an optical waveguide section of the distributed Bragg reflector has a quantum well layer which has the number of one or more layers of periods and a structure independent of the optical waveguide section including the active section and which is disposed at least at a section extending in a direction of an optical axis of the distributed Bragg reflector,

8. A wavelength tunable DBR laser diode according to claim 8, wherein a semiconductor optical amplifier is further connected optically to the other end of the optical combiner.

9. A wavelength tunable DBR laser diode according to claim 1, wherein

first and second distributed Bragg reflectors are disposed, respectively, on both sides of the optical waveguide section including the active section, and

each of the optical waveguide sections of the first and the second distributed Bragg reflector has a quantum well layer which has the number of one or more layers of periods and a structure independent of the optical waveguide section including the active section and which is disposed at least at a section extending in a direction of an optical axis of the distributed Bragg reflector.

10. A wavelength tunable DBR laser diode according to claim 9, wherein at least one phase control section is

optically connected between the first and the second distributed Bragg reflector and the optical waveguide section including the active section; and

wherein the quantum well layer has the number of one or more layers of periods and a structure independent of the optical waveguide section including the active section and is disposed at least at a portion or an entire portion of the distributed Bragg reflector and the phase control section.